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## THE COMMERCIAL PARADOX.

A PAPER DISCUSSING CERTAIN IMPORTANT PROBLEMS IN TRANSPORTATION READ BEFORE THE MANUFACTURERS' CLUB, OF PHILADELPHIA, AT THE CLUB MEETING, FEBRUARY 13TH, 1888.

BY PROFESSOR LEWIS M. HAUPT, C. E.,  
*Of the University of Pennsylvania.*

In 1882 the manufactured products of this great city were estimated to be worth \$481,226,309, employing 242,483 persons, and comprising over 12,000 establishments. To-day the aggregate is even greater. It is, therefore, a question of no small magnitude to find a market for this large output at such a price as to leave a margin of profit for the manufacturer as well as for the transporter and broker.

In considering the methods by which this very desirable result may be obtained, it will become necessary to analyze rather minutely the various elements which make up the market price of an article, and to determine how they may be modified so as to increase the profits, as well as to extend the sales.

The market price is composed of two principal elements, *vis.*: cost of production and cost of delivery. The former includes the cost and transportation of raw materials, cost of handling, import duties, insurance, interest on plant, depreciation, wages and contingencies. The latter, cost of transportation, terminal charges, insurance, storage, portorage, commissions, and other items. From this statement it will be seen that the expense incident to transportation may form a large percentage of the commercial value. If the raw material, whether it be ores, cereals, fuels, textiles or other substances, be carried any considerable distance to the mills or factories, the cost of transportation will enter as a factor in both directions in the cost of the product. Hence it is that the selection of the site for the

<sup>1</sup> Reprinted from *The Manufacturer* of March, 1888. Vol. 1, No. 4, Philadelphia.



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plant forms so important an element in the success of a large establishment, and it is largely due to the proximity of fuel and ores that Philadelphia owes its great development in manufacturing industries.

For a given plant, with fixed rates of wages and good management, there is but little room for increased economy in the cost of manufacture, whereas the rates charged for transportation are often very variable and are readily affected by a large number of influences. It is manifest that for a stated market price, whatever reduces the cost of delivery should increase the margin of profit or extend the range of the market for any article. It is with reference, therefore, to the relation of cost of transportation to that of manufacture and the best methods of increasing the range of the market that I desire to direct your attention this evening.

First, let us consider the case of the raw material. If it can be delivered to our factories from over the sea (having been carried as ballast for a nominal rate), at a less price than the same quantity of domestic product will bring, then one class of economists will say, buy from the foreign markets, and give us a cheaper product, whilst the other class will require that a tariff be assessed which will debar the foreign and enable the home product to be worked to advantage. I do not propose to discuss the merits of this important question, but will merely state that if the American must compete with the European labor, the first effect will be manifested in a reduction of his wages, and consequently in his purchasing capacity that the equilibrium may be maintained; and the subsequent effect may be no wages at all. Moreover, the great range in latitude and altitude of this Republic is such as to yield almost every variety of crude product desired, whether animal, vegetable or mineral. The vital questions, therefore, of reducing the cost of the necessities of life and of retaining the margin of profit on manufactures without affecting wages, appears to me to resolve itself into a consideration of the methods for cheapening the cost of transportation and delivery, or else, where possible, of so changing the form and value of the product as to enable it to bear a higher rate or a longer haul to the market or the mill.

For example, will it pay the farmer best to ship his products in the form of grain and hay; or to concentrate them into live

stock or dressed meats, or to convert them into fleece or dairy products? The answer to the query is a local one, and involves too many uncertain elements to permit of a discussion at this time.

To illustrate the general principles upon which the solution of the transportation problem depends, I submit a few commercial maxims for your consideration.

The first is : *That the reduction of the rates of transportation increases the circle of patronage, or market range.*

The second proposition is : *That low rates create traffic.*

The third : *That competition produces low rates, and hence creates traffic.*

The fourth : *That increased facilities create traffic.*

The fifth : *That transportation by water is cheaper than by rail.*

The sixth : *That the improvement of the water-ways is beneficial to the railway, and the consequence* is that the water-ways are the best possible competitors and regulators of rates, and their improvements is beneficial not only to the railroads, but to every individual requiring food, clothing, shelter and other necessities, as well as the luxuries of life.

Some of these maxims are almost axioms, yet to impress their meaning and importance more forcibly, I have collated a few statistics to verify them more fully.

Thus with reference to the first proposition, let us see how far an article may be carried by the various means of transportation before its market value is entirely absorbed by the cost of movement. This distance I will call the market range. For this purpose I take the values in 1874, as given in the Windom Report on "Transportation Routes to the Seaboard,"<sup>1</sup> for a ton of wheat quoted at \$49.50<sup>2</sup> and with rates by canal at one-half cent per ton per mile ; railway, one and one-half cent ; and common roads, fifteen cents. "The table does not purport to show how far grain may be carried by river or lake, but unquestionably that distance is not less than twice the distance it can be carried by canal." This statement is confirmed by the latest report of statistician J. R. Dodge, as to the relative rates from Chicago to Buffalo via lake, and thence to New York via canal,<sup>3</sup>

<sup>1</sup> Appendix, page 127, letter from Breese J. Stevens, March 2d, 1874.

<sup>2</sup> \$1.50 per bushel.

<sup>3</sup> Page 613, Report, Number 46, Department of Agriculture, November, 1887,

so that the comparative lake or river rate would be one-quarter cent per ton per mile. Dividing the market value by these rates there result the following radii for the circle of distribution.

		Radii Cts. miles.	Tributary areas.
For carriage by common road @	15	330	341,946 square miles.
" " " railway @	1.5	3300	34,194,600 "
" " " canal @	0.5	9900	307,751,400 "
" " " river @	0.25	19800	1,231,005,600 "

In other words, if the cost of movement by river be taken as the unit, the relative rates in 1874 were as

<i>River.</i>	<i>Canal.</i>	<i>R. R.</i>	<i>C. R.</i>
1	: 2	: 6	: 60

the distance carried, as

<i>River.</i>	<i>Canal.</i>	<i>R. R.</i>	<i>C. R.</i>
60	: 30	: 10	: 1

and the areas affected, as the squares of these distances, or as

<i>River.</i>	<i>Canal.</i>	<i>R. R.</i>	<i>C. R.</i>
3600	: 900	: 100	: 1

At these relative rates, therefore, and under the given conditions, water carriage, by river or lake as affecting areas, is theoretically 36 times more beneficial than by rail, and 3,600 times more than by wagon. It is hardly necessary to add that these theoretical limits can only be roughly approached in practice, and that practically the other items of cost consume a large percentage of the market value. Thus, if it costs 50 cents per bushel, or \$16.50 per ton to produce wheat, the radii of the above circles of distribution would each be reduced 33 per cent. So the other fixed charges would still further contract the range; which will depend chiefly upon the margin between cost of production and market price. Each article will have its particular range, depending upon its character and utility, but all will be correspondingly affected by the relative rates of transportation. The market range, however, is found to *be extended by a reduction of rate*, which is the first point to be established.

2. That *low rates create traffic* will be accepted as a fact without proof. This law was fully appreciated by your worthy secretary in his able argument against reduction of duties by enlargement of the free list. He says "that mere reduction of duties, unless that reduction be carried almost to the zero point,

*will assuredly increase the revenues from customs* rather than reduce them. The certain effect of such reduction will be to enlarge importations in almost every case, with the result that the desired deficiency will be more than made good. This is a fact so well known and so generally admitted that no argument in support of it need be presented." Yet the evidence may be so clearly and briefly stated, and is so conclusive, that I trust I may be excused for introducing a few illustrations in the form of diagrams.<sup>1</sup> The first will show graphically (a) the rates from Chicago to New York by "all rail," by lake and rail, and by lake and canal in 1870 and 1871; and (b) the volume of the shipments of a single article (wheat) during the same time. Although the water route is longer, it takes the volume of traffic because it is cheaper. It is merely a question of rates. This diagram (a) also confirms the first proposition.

The converse of this proposition, than *an increase of traffic reduces rates*, is not necessarily true, for the rule with transportation companies used to be to charge "what the traffic will bear," and unless there was competition no amount of argument would prevail in lowering the schedule. Strange as it may seem, rates which were practically prohibitory were frequently maintained when a lower rate would have put in motion a larger amount of traffic, which could have been profitably handled. The business maxim of "small profits and quick sales," or lower rates and larger volume, is the best for transportation companies as well as for the general public; but it is a difficult problem to determine to what extent it should be carried. Yet every merchant and manufacturer is trying to solve it in such a way as to give a maximum of profit on his aggregate sales.

The third aphorism, that *competition creates traffic*, is so universally accepted that manufacturing and business centres have become almost synonymous with railroad centres, but when it is remembered that "where combination is possible, competition is impossible," it will be seen that the benefits to be derived from railroad competition may be extinguished by pooling, purchase, or otherwise. Combination is more difficult when the ways of communication are of such a character that they cannot be bought, and are free to anyone desiring to traverse them.

<sup>1</sup> The diagrams are omitted from this published statement, as being unnecessary to a full comprehension of the subject.



This condition is found to exist most nearly when waterways are brought into competition with railways, as is seen in New York, Chicago, St. Louis, and other places. Philadelphia cannot be considered a competitive point in this sense since she has no direct water communication with the great west. Pittsburg might be included, if the Ohio River were made navigable at all stages during the season.

Commissioner Fink says that "the Erie Canal influences the rates of transportation from Chicago, St. Louis, Cincinnati, etc., to the interior of the Gulf States, and all the rail rates are kept in check by water transportation." It is this water competition that has built up the metropolitan cities at the terminal points of the lake and canal systems. Astonishing as it may seem to one not familiar with the magnitude of our domestic commerce, it is stated, as a fact, that the entrances and clearances at the port of Chicago, and the tonnage as well, exceed that of New York and Philadelphia combined, and are more than four times as great as that of the latter place. The vessel tonnage of the lakes exceed that of our entire coastwise marine.<sup>1</sup>

The memorial of the Philadelphia Board of Trade to the last Congress, recites "That the rates on through traffic are largely fixed over the entire country by the competition of water routes, and as the railroads, in order to get any portion of the through traffic are compelled to approximate their rates to those charged by the water routes, they are necessarily obliged to accept on this through traffic a compensation but little in excess of the cost of carrying the same. That, in the judgment of your memorialists, no injury results from this course on the part of the railroad company; but on the contrary, it not only furnishes cheap flour and other provisions to the laboring classes of our country, but also enables an enormous volume of provisions, cereals, and other staples to reach the seaboard, and thence by ocean transportation the markets of other countries, and there meet on favorable terms the products of other parts of the world, thus placing the balance of trade in favor of the United States, and making it a creditor of other nations rather than debtor."

The effect of water competition is also shown by the fact that the rail rates to the east of Chicago are less than those to

<sup>1</sup> Total entrances and clearances for 1886, 22,372 vessels; tonnage, 7,877,080.



the west thereof, but I need not multiply the evidence in support of a proposition so universally accepted. It is thought by many that the delivery by rail is more rapid and certain than that by water. On this point the Windom Report states.<sup>1</sup> "It is also true practically, however it may be theoretically, that the rate (velocity) of movement by rail is but little, if any, greater than by water."<sup>2</sup>

Fourth, that *increased facilities beget traffic* was formerly regarded as a fallacy; but so convincing are the facts that the reading and observant public are becoming converts. As a rule, mere arguments are of little avail in changing public sentiment unless supported by an exhibit of actual results. The most convincing proofs of this proposition are to be found in the intramural travel of large cities as affected by increasing the capacity for traffic.

Thus, in London the omnibus traffic was increased by the addition of the underground metropolitan system; both of these were benefited by the establishment of the district railway. The traffic of these three was still further augmented by the addition of the tramways, and the rate of increase is greater on each system to-day than it was on any one before the existence of the others. The same conditions obtain in reference to the passenger traffic in New York. The greater the velocity and capacity of the lines be made, the larger is the volume of business, and the more rapidly the cities' growth.

*The fifth proposition, that transportation by water is cheaper than by rail*, may be readily established by reference to the scheduled rates<sup>3</sup> between two points connected by rail and by water. Thus, between Chicago and New York the rates in 1887 were, for grain (wheat), via Lake Shore and Michigan Southern Railway, 981 miles, 25 cents per hundredweight, or 15 cents per bushel; \$5.00 per ton, or .509 cents per ton per mile.

By lake to Buffalo, 1000 miles, 4.7 cents, or 1.567 mills per ton per mile.

By canal to New York, 504 miles, 4.6 cents, or 3.04 mills per ton per mile.

<sup>1</sup> In 1884 the through rates, by lake, from Chicago to Buffalo were two and two-tenths cents, and from Buffalo to New York, via Erie Canal, five cents.

<sup>2</sup> Page 126, Appendix.

<sup>3</sup> See Report of Department of Agriculture, No. 46, November, 1887; Rates for October.

By lake and canal to New York, 1504 miles, 9.3 cents, or 2.00 mills per ton per mile.

Rates via Chicago and Atlantic Railroad, 986 miles, are the same as those via Lake Shore and Michigan Southern Railway, whilst those by water are 5.7 cents per bushel less, yet the distance is over 50 per cent. greater.

By ocean to England, 3080 miles, 7.0 cents, or 0.77 mills per ton per mile.

Taking the ocean rate as the unit, the relative rates are as follows: By ocean, 1; by lake, 2; by canal, 4, and by railroads, 6.7; or comparing the present rates with those previously given in 1874, there results: Ocean,  $\frac{1}{2}$ ; lake or river, 1; canal 2, and railroad,  $3\frac{1}{3}$ . Thus, while the actual rates by river and canal have each fallen 40 per cent., the railroad rates have been reduced about  $56\frac{2}{3}$  per cent., all of which reductions are due to the increased capacity and improvements brought about by competition, and the large volume of traffic developed by the rapid growth of facilities for inter-communication.

This brings us to our last proposition, which is the commercial paradox, namely, that *the improvement of the waterways is beneficial to the railways*. I say it is paradoxical, since I believe the impression to be general that whatever freight or passenger traffic is carried by water is just that much abstracted from the railways (when they exist in competition), and not only is there a reduction in the volume but also in the rate of tariff, so that the railroad must suffer in consequence. Certainly this is a natural deduction, and that it is a prevalent one is shown by the open opposition made by the railroad interests to the general improvement of our navigable rivers, whenever such proposed improvements parallel the railroad lines.

I have made an analysis of the testimony relating to this point taken before the Cullom Committee, and find that of ninety-one persons, 73, or 80 per cent. were in favor, 15, or 17 per cent. were opposed, and 3 per cent. undecided. Of the fifteen opposed, ten were railroad officials, three farmers, one merchant, and one a machinist. Eight railroad commissioners were in favor of improving the waterways.

If the impression is fallacious, it must be in consequence of the existence of other elements not generally recognized, yet which are potent factors in determining the result. And what

are they? They are the chain of propositions which we have already briefly considered, whereby the railroads are benefited; for the revenue of a railroad is dependent above all things upon population, and population is a function of cheap, certain, and uniform rates of transportation, as well as cheap power for manufactures. These in turn are assured by competition, and there is no competition so reliable as that furnished by navigable waters. Hence it is that the more rapidly the streams are improved, the more dense will the population become and the greater the volume of business not only for the river, but also for the railroad.

Concerning this point, Mr. Stevens wrote to the Windom Committee on Transportation Routes:<sup>1</sup> "The creative power of water transportation is not restricted to the increase of existing values, but extends to the creation of values where otherwise none would exist. Certain articles of commerce, such as stone, brick, gravel, firewood, earth, etc., become articles of commerce almost exclusively from this operation. It is by some asserted that its benefits in the creation of new values are greater and in every way more important than its benefits in the enhancement of existing values."

This proposition is further confirmed by Col. William P. Craighill, in his report to the Chief of Engineers for 1885, on the improvement of the Great Kanawha, wherein he says: "As the improvement of the river (Great Kanawha) has progressed, the commerce on it, notably the shipment of coal, has greatly increased. This has not been to the disadvantage of the Chesapeake and Ohio Railroad, as some supposed would be the case, for the statistics show an increase in the coal business of that highway of trade and travel."<sup>2</sup>

Certainly, if the existence of a navigable channel be injurious to a line of railways, I know of no better practical instance to prove it than that of the New York Central and Hudson River.

Here we find a grand navigable river, linked to a magnificent chain of inland seas by a canal having a capacity of 16,000,000 tons, and paralleled by a trunk line of railroad of less length than the canal and river. There is also a shorter line of

<sup>1</sup> Appendix, page 127.

<sup>2</sup> P. 1846, Rep. of C. of Eng., 1885, Vol. III.

all-rail communication which is not parallel to a water route between the termini, hence if the water line is not beneficial but injurious, the New York Central should suffer in comparison with its competitor, the New York, Lake Erie and Western.

Please note the facts: The distance from Buffalo to New York, via the Central, is 441 $\frac{3}{4}$  miles; via Erie Canal it is 502 miles, or 60 miles further, and by the Erie Railroad it is 423 miles, or 18 $\frac{3}{4}$  less; therefore, the latter should have the advantage, at least in through traffic.

The Erie Canal was opened in 1825, and enlarged in 1862 from a capacity of 5 to 16 millions of tons, the boats being increased from 76 to 240 tons.

The New York Central Railroad was organized August, 1853, by the consolidation of nine links, the first of which (the Albany and Schenectady), was opened September 12th, 1831. Nearly all of these lines were parallel to the canal, and may be said to have been created by the business developed by it. The Hudson River Railroad was opened October 3d, 1851, as an outlet to the other system. The Erie was opened to Dunkirk, April 22d, 1851, so that the two roads may be said to be of the same age. Let us now compare their balance sheets for 1886, and examine the results:

*New York Central and Hudson River Railroad.*

	Passenger.	Freight.	Total.	Percentage of operating expenses.
Gross earnings.....	\$10,341,850.12	\$17,699,785.47	\$28,041,636.59	62
Gross expenses.....	5,700,678.23	11,753,281.98	17,453,960.21	
Net receipts.....	\$4,641,171.89	\$5,946,503.49	\$10,587,676.38	

*New York, Lake Erie and Western Railroad.*

Gross earnings.....	\$4,193,820.85	\$14,116,674.30	\$18,310,495.15	66
Gross expenses.....	2,969,786.39	9,040,286.41	12,010,072.80	
Net receipts.....	\$1,224,034.46	\$5,076,387.89	\$6,300,422.35	

This exhibit shows conclusively that the balance is in favor of the longer line bordering the water route, by nearly 68 per



cent. Doubtless most of this difference will be found to result from the local passenger traffic due to greater density of population. Referring to the report of the Railroad Commissioners for 1886, I find these statements :

*New York Central and Hudson River Traffic and Mileage Statistics.*

	Through.	Local.	Total.	Per Cent. of Local Total.
Passengers carried.....	619,278	14,042,849	14,662,118	96
"    "    one mile.....	127,547,623	348,581,106	476,128,729	73
Tons of freight.....	8,605,852	3,870,583	12,636,435	36
"    "    carried one mile..	1,900,550,903	196,909,070	2,397,460,023	21

Thus it appears that 96 per cent., or nearly all of the passenger business, is local. Of the total passenger mileage 73 per cent., and of the freight mileage but 21 per cent., are local.

As the freight business is relatively small, it might be supposed that it is taken by the canal or the shorter railroad line, but a glance at the freight column shows that the Central still carries much more through freight than either the Erie Canal or Railroad.

The statement for the New York, Lake Erie and Western River Railroad gives :

*Erie.*

	Through.	Local.	Total.	Per Cent.
Passengers carried.....	507,987	5,753,131	6,261,118	92
"    "    one mile.....	49,914,259	133,290,200	183,204,462	75
Tons of freight.....	3,162,876	9,644,042	12,806,918	75
"    "    carried one mile...	912,898,126	1,145,495,896	2,058,394,022	57

*New York Canals.*

Tons of freight (1886)..... 5,293,982

The local freight of the Erie is about three times the through tonnage. This is because 62½ per cent. of the total tonnage is coal and coke ; flour and grain being but 9.21 per

cent., and manufactures and merchandise only 5.34 per cent.; whilst on the Central only 23 per cent. is coal and coke; 20 per cent. is flour and grain, and 28 per cent. manufactures and merchandise.

Thus it will be seen that the Erie business is derived largely from its adjacent mining territory, and that it can scarcely be considered a competitor even for the through traffic from the lakes, although it taps them at two points, Dunkirk and Buffalo, while the Central, notwithstanding the free canal and its own great length of line, is far more profitable than its rival.

Other instances might be cited in support of this sixth proposition, but I believe these will be sufficient, and time constrains me to sum up the *consequences*.

If the foregoing propositions be accepted as true, it must follow that the "general welfare" of this country would be promoted by opening up our much-neglected natural highways of trade, and so make such an investment of our natural surplus as would return to the people a manifold interest on their taxes.

In my opinion spending public money in constructing permanent fortifications is equivalent to burying it in a sinking fund, from which it can never be recovered, as such defenses would be useless against modern methods of attack. We need speed and mobility in our batteries, or if they must be on land and stationary, then sand or earth are better than stone.

Money spent on public buildings is used for the convenience of the public service, and may or may not be an economical investment. It gives temporary employment, however, to a limited class of artisans; but money spent in the improvement of our rivers and harbors is an investment which stimulates every possible kind of industry, lowers the rates of transportation, extends the range of the market, increases the purchasing power of wages, lowers the price of food and other products, reduces rates of insurance, prevents disasters from floods, reclaims valuable property from inundations, and confers many other benefits upon the country at large. Need there be any question, therefore, as to how it is best to dispose of a portion of the surplus?

That these conclusions are not mere generalities, I will submit only a brief statistical statement showing a *comparative*

*exhibit of the market range of wheat and the relative benefits conferred by the various ways of communication at present rates.*

*Based upon October Prices from Chicago to Liverpool, 1877.*

	Rate per Ton, per Mile.	Theoretical Market Range at 33½ per Ton, or \$1 per Bushel.	Relative Distances.	Relative Tributary Areas.	Relative Benefits.
	Cents.	Miles.			
Railroad.....	.508	6,666	3	9	1
Canal.....	.304	11,111	5	25	2.8
Lake or River.....	.157	22,222	10	100	11.1
Lake and Canal.....	.200	16,666			
Ocean.....	.077	43,290	20	400	44.4

From this table it appears that at canal rates the area benefited would be 2.8 times that at rail rates ; at lake or river rates it would be 11 times, and at ocean rates 44 times greater, showing the superiority of movement in bulk with a minimum of fixed expenses and low ratio of terminal charges.

It has been proved by careful experiment on the Elbe that as the tonnage is doubled from 150 to 300 tons the cost of tonnage is lowered from .55 to .44 of a cent per ton, or about 20 per cent., and a further increase in bulk still further reduced the cost.

On the English waterways, which are chiefly artificial, the actual cost of movement is 0.50 cents per ton per mile, and the terminal charges are 0.25 cents.

The tendency, therefore, is towards larger vessels in the interest of economy ; but this is limited by the amount of water available over the bars at the harbor entrances and in our navigable rivers.

It may not be generally known that there are not more than six or seven<sup>1</sup> alluvial harbors on the Atlantic and Gulf coasts where the depths over the bar exceed sixteen feet, and there are many of our so-called navigable rivers where the depth in summer may not exceed two feet. The draught of the largest ocean steamer is twenty-six feet and over : and it is no common occurrence for them to have to wait for the tide to cross even the New York bar.

<sup>1</sup> New York, Philadelphia, Norfolk, Port Royal, the mouth of the Savannah River and New Orleans.

The possibilities of our development in this direction can only be realized by looking at the figures giving the extent of the coast line of the United States.

A calculation by the coast survey in 1853, gives the total shore line of the United States (including bays and inlets and the great lakes, and excluding Alaska) at 25,476 miles. In the river system there are in the Atlantic and Gulf States to the head of tide water, 11,711 miles; in the central basin, 35,644 miles, and in the Pacific coast, 1710 miles, making a total shore line of rivers in the United States of 49,065 miles.<sup>1</sup>

We may say, therefore, that in round numbers we have 25,000 miles of coast line, 50,000 miles of river shore line, and 160,000 miles of railroad, but that of the first two items a very small percentage is available for commerce, and yet at current prices the rate charged for one mile of railroad would transport the same load six and two-thirds miles on the ocean, or three and one-third by river.

Although my time has about expired, I feel constrained, with your indulgence, to carry this argument to its logical conclusion.

If it be asked why the waterways are in this deplorable condition, I would reply that it is because they are under the jurisdiction of various authorities having no direct interest in their improvement. The United States, as a whole, has none; the States by themselves have none, and the riparian owners are not concerned beyond their own requirements, which are generally local. It is only by the concerted action of influential bodies of citizens bringing a pressure to bear upon the representatives of their district, that an appropriation can be obtained; first, for the survey, and then for the work, if found necessary. Thus, in the absence of any well-organized department for conducting these important civil works of the government, such as exists in all the prominent European countries, much time and energy is wasted in efforts to secure an appropriation for an important, and it may be, urgent improvement, and these concessions are frequently only obtained by an extended distribution of patronage. Again, when the River and Harbor Bill fails, as it has done at the closing session of the last three Congresses, operations must be suspended, the plant depreciates, the civil corps is

<sup>1</sup> Page 33, Report of the Commissioner of Navigation, Washington, D. C., 1886.



almost disbanded, and the works themselves are frequently washed away from the lack of funds for completion.

Certainly this is not an economical method of administration. Without detaining you to listen to a review of the numerous defects in the present methods of administering these works, I may indicate their characteristics by stating that the remedies desired lie in the direction of permanency of residence for the officers in charge, individual responsibility for results, adequacy, and certainty of appropriations, and a system of promotions based upon relative ability and not upon military succession.

These results can readily be secured by dividing the country into topographical basins, and assigning to each a chief engineer, whose term of office should be for life, subject to removal only for incompetency or misdemeanor. In this way only can a thorough knowledge of the physical, mechanical, commercial, social, legal, and administrative elements be intimately united in an efficient, local, executive officer.

By some such plan there would be a possibility of expedition and effective work being done upon our navigable rivers. Without it "it may be for years" before radical improvements are effected.

Let us apply the methods of the present régime to the requirements of this port.

We are hemmed in on every side, and out of thirty-eight miles of water frontage (counting both banks of the Schuylkill) there are only (omitting the Schuylkill) six miles, or about 15 per cent. available. As this is an exceedingly important matter for the interests of Philadelphia, it will bear a moment's investigation: Beginning on the Delaware, at the lower limits of the city, the four miles reaching to Hog Island are cut off by the Maiden Island dike, just completed to create a channel over the Mifflin bar. Most of the next three miles reaching to the Schuylkill belong to the government reservation at Fort Mifflin (where a solitary sargeant "Holds the Fort") which is of no possible use to the government, unless it be for storage of worn-out material; and of no service to the city as a means of defense, being entirely too close. The next three and a half miles are occupied by League Island and the Horseshoe shoals, thus making about ten miles which are entirely occupied by the government, without benefit to it, and greatly to the disadvantage of

this port. In the next six miles, from Greenwich to Richmond, are to be found the limited commercial facilities which it is so desirable to extend.

And here the deep water navigation is terminated by the Five-Mile Bar, which cuts off the remaining eight miles of deep water to the city limits on the Poquessing.

Manifestly a portion of the reservations should be relinquished to the city, and the bars be reduced to a sufficient extent to open the upper river to deeper draft vessels, and to improve the entrance to the Schuylkill where the bar requires frequent attention.

The worst obstructions on the river are those within the limits of the port. With them removed we should practically have ocean rates of transportation to all ports that can be reached by tidal waters. The complaints of lack of facilities at this harbor are not due merely to the contracted western channel abreast of the islands, but to a neglect to appreciate and develop the extended facilities for foreign commerce which nature has so abundantly provided. The city is now obstructed by six tranverse lines of railroads at grade, and to load steamers of the size of those of the Cunard Line (470 feet long, 57.2 beam, 37.2 depth of hold) having a net registered tonnage of over 4000 tons, would require so large a freight movement as to still further embarrass ordinary business transactions and produce frequent blockades and casualties. To load every such vessel would require about 250 cars of freight, if the cars were full. It is not difficult to conceive of the condition of Delaware Avenue if many vessels of this size were to attempt to discharge and load along this frontage within a reasonable time.

The main obstructions to navigation are the shoals near the limits of the city, namely, at Maiden Island and Five-Mile Bar, and these are the ones that should be deepened, to open our gates to foreign or even domestic commerce, to reduce the rates of transportation, and to extend the market range of our products.

There was a time when Philadelphia had independent, internal waterways north, south, and west; but these have been gradually absorbed and controlled by competing interests so that to-day the only open door for navigation is that by the river, via the capes. It has been proposed to reduce this distance by the

construction of a canal to the Atlantic Ocean near Absecom Inlet. Without stopping to discuss this project, I need only say that it would not reduce the time of reaching the ocean, because of the limited velocity at which vessels of large size can navigate such artificial channels. And there is already a much shorter artificial waterway to the ocean via the Delaware and Raritan Canal, which should be purchased and enlarged by the National Government at very much less expense, and made an important link in an all-water route via the Erie Canal, the lakes, the Hennepin, or other canal (when completed), and the Mississippi to a large part of the interior of our federal domain.

Concerning the influence of this canal on the commerce of Philadelphia, it was testified by an eminent authority before the Windom Committee, that in 1870 more tons passed through the Delaware and Raritan Canal than all the foreign tonnage to and from New York for that year, and that it aggregated about 4,000,000 tons per annum. It exceeded by three times the entire tonnage both ways of the Suez Canal.

The same authority in his testimony before the Cullom Interstate Commerce Committee, in 1885, states that this canal is now owned by the railroad company between Philadelphia and New York ; that the tonnage of the canal has greatly diminished ; that the Erie Canal is the only one of any importance in the country not under the control of the railroads, and that, consequently, there is no use in keeping up the canals at all ; that the State canals were all bought up by the railroads between 1858 and 1875, and in some instances tracks have been laid on the tow paths, thus destroying their competition.

Another witness states that the cost of improving the water routes would come back to the people, many times over, in the reduced rates of freight which they would secure even if *all* the freight went, as now, by rail, and the canals were unused.

Governor Seymour says that by reducing the tolls of the Erie Canal, the balance of trade was largely thrown in favor of the United States, and in summing up their evidence, the Cullom Committee concludes, " That natural or artificial channels of communication by water when favorably located, adequately improved, and properly maintained, afford the cheapest method of long-distance transportation now known, and that they must continue to exercise in the future, as they have invariably exer-

cised in the past, an absolute controlling and beneficially regulating influence upon the charges made upon any and all other means of transit."

In 1883 Mr. Blodgett wrote that the export of manufactured products to foreign countries from Philadelphia amounted to about \$25,000,000 annually, and that one-half of this went by way of New York, in consequence of the absence of shipping facilities from this port direct. Yet this is a small part of the output of our home manufactories upon which the freight rates to the interior, as well as to the foreign ports, might be considerably reduced if there were greater competition by water.

To extend the benefits of the Erie Canal to Philadelphia, via the Delaware and Raritan ; to open an enlarged and shorter line to New York by water ; to connect Philadelphia with the Mississippi Basin by means of the proposed Hennepin or other canal ; to develop and improve the navigable waters of the United States ; to place our shipping interests upon an equality with those of other nations by suitable subsidies, and to open up our harbor entrances to commerce, are matters which would benefit not only the manufacturer, shipper, farmer, merchant, artisan, and constructor, but every individual living in this Republic, and they merit the serious attention not only of the legislator, but of every public-spirited and patriotic citizen.

Congress does not take the initiative, but will receive and act upon the suggestion and recommendation of an intelligent constituency. These, gentlemen, are objects worthy of your consideration. They will not be attained without an effort, and it is for the manufacturers and business men of Philadelphia to take the initiative if they would secure results so beneficial to themselves and the community. It is not sufficient to think, nor to talk, but, in the language of our illustrious poet, we should

" Act—act in the living present,  
Heart within, and God o'er head."





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